

NOAA frost point instrument

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The NOAA/CSD frost point instrument was designed to run unattended under the wing of NASA's WB-57F. An aircraft rated Stirling cooler provides cooling to 100 K. The cooler avoids consumables and provides a large temperature gradient that improves the response time. The vertical pylon houses the optics and provides aerodynamic pumping of the sample volume. At the bottom of the pylon there is a boundary layer plate and a vertical inlet that separates particles larger than 0.2 microns from the sampled air. There are two channels that use blue LEDs and scattered light to detect frost on the mirrors. Diamond mirrors are used for low thermal mass and high conductivity. The two channels are to be used to understand frost characteristics under flight conditions. High flow rates are used to decrease the shear boundary layer to facilitate diffusion through the boundary layer to the mirrors. In the future, the goal is to have the two channels agree to better than 0.1 deg. C with a response time of 15 deg/sec. For the CR-AVE flights, data is available from only one of the channels.

Weight 52 lbs Power 15A 28v, 10A 115 400 Hz



Figure 1: NOAA Frost Point installed under the wing of the WB-57F.

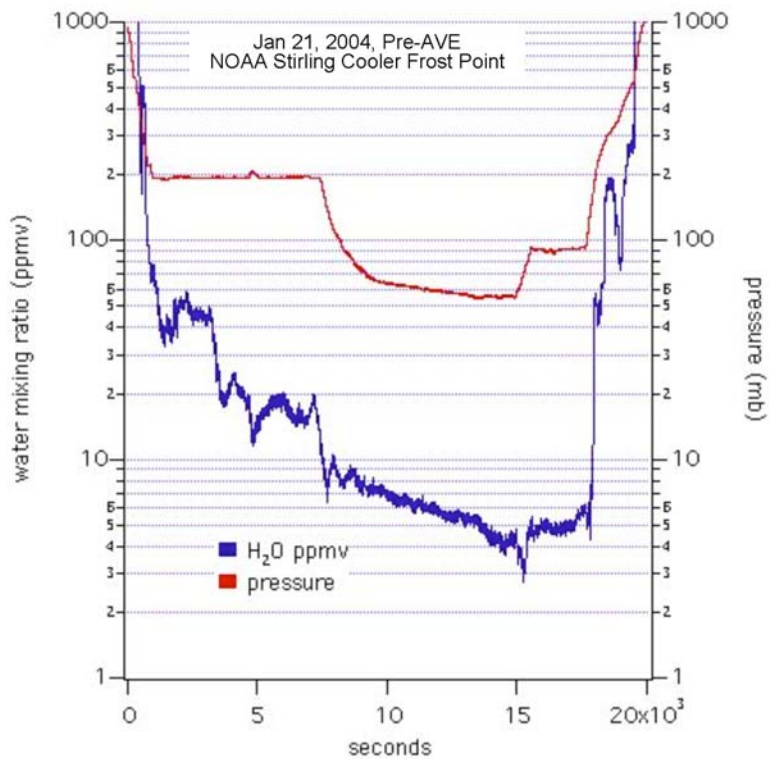


Figure 2: Data from a flight on Jan 21, 2004, during the Pre-AVE mission.

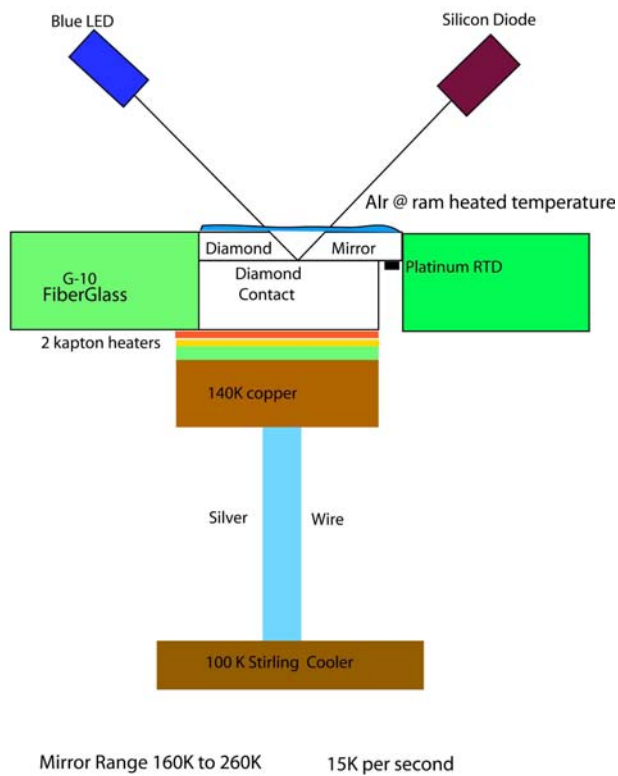


Figure 3: Schematic of the mirror assembly.